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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,379	09/12/2003	Zhiping Yin	303.864US1	6694
21186	7590	11/10/2005	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH 1600 TCF TOWER 121 SOUTH EIGHT STREET MINNEAPOLIS, MN 55402			ROSASCO, STEPHEN D	
			ART UNIT	PAPER NUMBER
			1756	

DATE MAILED: 11/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/661,379

Applicant(s)

YIN ET AL.

Examiner

Stephen Rosasco

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 and 113-134 is/are pending in the application.
- 4a) Of the above claim(s) 113-134 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/22/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### Detailed Action

In response to the Amendment of 9/22/05, wherein claims 1 and 13 were amended and claims 113-134 were added, the examiner withdraws the Babich et al. reference the previous office action rejections and includes new rejections here.

Newly submitted claims 113-134 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: these claims are to a semiconductor memory device which was restricted out as Group II.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 113-134 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

In claims 1 and 13, the added limitations were, - the substrate including at least one alignment mark... for improving a reading of alignment marks in the substrate in the wavelengths between 400 nanometers and 700 nanometers.

Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase -for improving a reading of alignment marks in the substrate- is unclear in that it is not defined in any measurable way.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Samant et al. (6,313,896).

Samant et al. teach the limitations of amorphous carbon layer with alignment mark, the same thickness of the amorphous carbon layer and the improvement in the transparency in the visible spectrum.

Samant et al. teach a method for producing a multi-domain alignment layer, as well as multi-domain alignment layers produced thereby and liquid crystal displays comprising the same, are provided.

Dry process materials finding use as alignment films on the surface of the substrate are materials that are optically transparent and amorphous or fine-grained, where by "amorphous" is meant that the atomic structure of the material has no long range order. Suitable materials are also characterized by exhibiting ionic or partially ionic, covalent or partially covalent bonding.

Dry process materials useful include, hydrogenated diamond-like carbon (DLC), amorphous carbon. In a preferred embodiment the alignment film comprises hydrogenated DLC. It should be understood that any type of film material may be used so long as the film formed is optically transparent, particularly in the visible spectrum.

Samant et al. also teach (col. 7, lines 16-37) that the alignment film may range in thickness from about 2 to 10,000 .ANG usually from about 5 to 1,000 ANG and more usually from about 10 to 100 ANG. Suitable materials are insulating, optically transparent, particularly in the visible range, and may be materials that are produced by either wet processes or dry processes, where dry processed materials are preferred. Wet

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process alignment materials or films that find use include polyimide films, and the like, where such materials, as well as methods for their deposition on the surface of a transparent planar component, are known to those of skill in the art.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Samant et al. (6,313,896) in view of You et al. (6,864,556).

The claimed invention is directed to a device in a process, the device comprising: a substrate; a device structure formed over the substrate;

and a masking structure formed over the device structure, the masking structure including an amorphous carbon layer, wherein the amorphous carbon layer is transparent in visible light range (400-700 nm).

And wherein the amorphous carbon layer has an absorption coefficient between about 0.15 and about 0.001 at wavelength of 633 nanometers.

And wherein the amorphous carbon layer has a thickness greater than 4000 Angstroms.

And wherein the masking structure further includes a silicon oxynitride layer formed over the amorphous carbon layer.

The applicant states that some conventional masks are made of amorphous carbon. However, an amorphous carbon mask at some thickness may have a high absorption of optical light, causing the amorphous carbon mask inapplicable for some processes.

And further the applicant states that since the amorphous carbon layer 430 is transparent in the visible light range, the thickness of amorphous carbon layer 430 may not be limited. Thus, amorphous carbon layer 430 may be formed with a thickness to properly etch device structure 320 while allowing an accurate reading of the alignment marks such as alignment marks 214.

Thus the amorphous carbon layer is protective of the surface during etching and the reason for having it transparent to optical light is so that alignment can be performed by viewing through the layer.

Samant et al. is repeated here as disclosed above.

The teachings of Samant et al. differ from those of the applicant in that the applicant teaches different thicknesses to the amorphous carbon layer.

You et al. teach a method of fabricating a semiconductor device having a multi-layered anti-reflective coating, the method comprising: forming a patternable layer above a substrate; forming an organic polymer layer of the anti-reflective coating over the patternable layer, wherein the organic polymer is poly-p-xylylene; forming a silicon oxynitride layer of the anti-reflective coating over the organic polymer layer; and forming a photoresist pattern over the silicon oxynitride layer.

And wherein the organic polymer layer has a lower coefficient of thermal expansion differential with respect to the patternable layer than amorphous carbon layer.

You et al. also teach that the organic polymer used in organic polymer layer 112 is also selected to have the property of absorbing radiation in the UV and DUV range, while at the same time being transparent to visible radiation. Thus, the organic polymer layer 112 of semiconductor device 200 stands in contrast to the amorphous carbon layer 106 of semiconductor device 100 shown in FIG. 1. The amorphous carbon layer 106 of semiconductor device 100 absorbs visible radiation, as well as UV and DUV radiation. Thus, during the semiconductor device fabrication process, the detection of alignment marks by a stepper may be hindered because of the opaqueness of the amorphous carbon layer 106. As a result, the overlay accuracy of various layers may be compromised and registration errors may occur. In contrast, the organic polymer layer 112 of semiconductor device 200 provides the same advantageous UV and DUV absorption properties of the amorphous carbon layer 106, but is, in addition, advantageously transparent to visible radiation. Thus, the organic polymer layer may be used in a BARC to reduce reflection of UV and DUV radiation while at the same time being transparent to visible radiation used by a stepper to detect alignment marks. As a result, the overlay accuracy of the various layers of semiconductor device 200 is advantageously improved and registration errors are reduced.

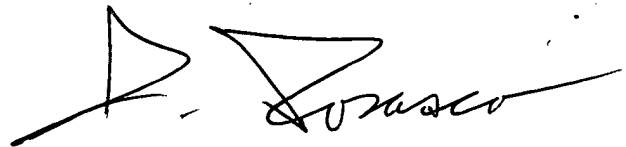
It would have been obvious to one having ordinary skill in the art to take the teachings of Samant et al. and combine them with the teachings of You et al. in order to make the claimed invention because the thickness of the coating is a function of the processing parameters, e.g., etching, and the use of silicon oxynitride as a capping layer for a organic layer is taught and the applicant is using known structures for their known benefits.

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Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, elongated flourish extending to the right.

S. Rosasco  
Primary Examiner  
Art Unit 1756

S. Rosasco  
11/03/05